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Title: Application of artificial neural networks to the development of improved multi-sensor retrievals of near-surface air temperature and humidity over ocean

Abstract:

Improved estimates of near-surface air temperature and air humidity are critical to the development of more accurate turbulent surface heat fluxes over the ocean. Recent progress in retrieving these parameters has been made through the application of artificial neural networks (ANN) and the use of multi-sensor passive microwave observations. Details are provided on the development of an improved retrieval algorithm that applies the nonlinear statistical ANN methodology to a set of observations from the Advanced Microwave Scanning Radiometer (AMSR-E) and the Advanced Microwave Sounding Unit (AMSU-A) that are currently available from the NASA AQUA satellite platform. Statistical inversion techniques require an adequate training dataset to properly capture embedded physical relationships. The development of multiple training datasets containing only in-situ observations, only synthetic observations produced using the Community Radiative Transfer Model (CRTM), or a mixture of each is discussed. An intercomparison of results using each training dataset is provided to highlight the relative advantages and disadvantages of each methodology. Particular emphasis will be placed on the development of retrievals in cloudy versus clear-sky conditions. Near-surface air temperature and humidity retrievals using the multi-sensor ANN algorithms are compared to previous linear and non-linear retrieval schemes.